

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Components Requiring Independent Verification</p> <p>a) Components that ensure safe and reliable operation, as determined by safety analysis, should receive independent analysis in accordance with the following requirements:</p> <p>b) Safety-Related Systems</p> <p>i) Not required if:</p> <p>(1) Mispositioning would not affect the system performance</p> <p>(2) Mispositioning would be immediately known to operator</p>	<p>1) Components Requiring Independent Verification</p> <p>a) Safety significant structures, systems and components at the accelerator complex receive independent analysis in accordance with the following requirements</p> <p>b) Safety-related systems include relay based access control system, PLC based access control system (PASS), radiation shielding and beam dumps, and radiation monitor system and the ODH monitoring system , which are independently reviewed by the C-AD Radiation Safety Committee since mispositioning would affect the system performance. Kirk Key systems for electrical safety and hydrogen and flammable gas monitoring systems are reviewed by the Accelerator Systems Safety Review Committee and the Experimental Safety Review Committee.</p> <p>i) Independent verification is required at C-AD:</p> <p>(1) Fire suppression and alarm systems are acceptance tested by Plant Engineering Fire Alarm Technicians following installation; however, mispositioning of this system does not effect accelerator performance</p> <p>(2) Mispositioning of safety related systems would not necessarily be apparent to operators; although indicators for the access control system are displayed in MCR. The access control systems have dual, independent and fail safe devices that are used to block beams or switch beams off and independent functional verification of these devices is performed every year by the C-AD Access Controls Group. See for example, <a href="#">OPM 4.93.1</a>, "U-Line Upstream Access Security Gate Subsystem Check." The position and thickness of shielding and beam dumps is independently verified by fault studies after construction, fault studies that are performed by the C-AD Radiation Safety Committee. See <a href="#">OPM 9.1.9</a>, "Fault Study Procedure for Primary and Secondary Areas." The response of the radiation monitor system is independently verified by the Radiological Controls Division FS Group and the</p>	<p>1) Components Requiring Independent Verification</p> <p>None</p>

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<p>(3) Independent verification would involve significant radiation exposure</p> <p>c) Non-Safety Related Systems</p> <p>i) Independent verification would be appropriate if mispositioning could lead to unplanned shutdowns, challenges to safety systems, or cause the release of radioactive or hazardous material.</p>	<p>C-AD Instrumentation Group prior to each running period see <a href="#">OPM 8.15.4</a>, "Procedure for a Functional Test of the Chipmunk Computer Interface." Kirk Key electrical safety systems are installed and tested under the purview of the Chief Electrical Engineer. Hydrogen gas monitoring systems are checked each shift by the C-AD Cryogenic Target Watch during operations, see <a href="#">OPM 8.12.3</a>, "Introduction of Explosive Gas into the Experimental Area."</p> <p>(3) Independent verification does not involve significant radiation exposure at C-AD. The accelerators can be shut-down for testing of safety systems and testing does not require one to enter areas where there are high residual radiation levels.</p> <p>c) Non-safety related systems where independent verification is appropriate include beam loss monitoring systems, water cooling systems, activated soil caps and cryogenic systems</p> <p>i) Liaison physicists review the response of beam loss monitoring systems during running periods. Liaison engineers annually check the integrity of the activated soil caps. The Water Systems Group monitors cooling systems for leaks. Water detection mats and secondary containments are used, and tritiated cooling water system pressures are monitored and alarmed. Response to alarms for tritiated water leaks is covered by procedure <a href="#">OPM 10.2</a>, "Response to Tritiated Water Spills." Cryogenic operators monitor system pressures, temperatures and valve positions continuously during operations, see <a href="#">OPM Chapter 7</a>, "Cryogenic Operations."</p>	

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<p>2) Occasions Requiring Independent Verification</p> <p>a) Returning equipment to service after maintenance</p> <p>b) Removing equipment from service</p> <p>c) Periodic checks during normal operation</p>	<p>2) Occasions Requiring Independent Verification</p> <p>a) Equipment startup procedures cover check out or start up of systems. See <a href="#">OPM Chapter 5</a>, "Equipment Startup Procedures." New equipment is verified for service via <a href="#">OPM 2.27</a>, "Release of New Systems to Operations."</p> <p>b) Equipment shutdown procedures include for example <a href="#">OPM 8.12.6</a>, "Securing CAS During C-A Shutdown" and <a href="#">OPM 5.29</a>, "AGS, Booster Ring and Transport Line Shutdown." At times, independent verification of an RSLOTO is required. See <a href="#">OPM 9.1.16</a>, "Lockout/Tagout for Radiation Safety."</p> <p>c) Periodic checks during normal operations are made by the CAS Watch personnel and by the Radiological Control Technicians</p>	<p>2) Occasions Requiring Independent Verification</p> <p>None</p>
<p>3) Verification Techniques - General Guidelines</p> <p>a) Independence</p> <p>i) Should be conducted in a manner to identify the component, its required position and actual position</p> <p>b) Remote Position Indicators</p> <p>i) Perform check local to the device, unless precluded by ALARA</p> <p>c) Process Parameters</p> <p>i) Should not be used as the only indication of a components' position. A review should be made to determine when these parameters would be acceptable</p>	<p>3) Verification Techniques - General Guidelines</p> <p>a) Independence</p> <p>i) Specific examples of independent verification techniques may be found throughout the OPM. For example, see attachments to procedure <a href="#">OPM 2.6.1</a>, "Procedure for Lockout/Tagout of AGS and Booster Rings During Accelerator Operations" that require two operators to identify the component and its position</p> <p>b) Remote Position Indicators</p> <p>i) Position indicators are checked local to the device. For example, access control gates are reset locally after an area is swept clear of people in order to enable the access control system to allow beam into a beam line or accelerator</p> <p>c) Process Parameters</p> <p>i) Process parameters, such as radiation monitor set points for alarm in MCR or for interlocking the beam, are reviewed by C-AD Radiation Safety Committee. See <a href="#">OPM 8.15.3</a>, "Chipmunk Radiation Monitors." Other safety significant parameters are reviewed by Chief Engineers; see <a href="#">OPM 9.2.3</a> "Procedure for Chief Engineers to Certify Conformance of Devices."</p>	<p>3) Verification Techniques - General Guidelines</p> <p>None</p>

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<ul style="list-style-type: none"> <li>d) Throttled Valves <ul style="list-style-type: none"> <li>i) Position indicators should be used in conjunction with observing the actions of valve actuator to proper verification</li> </ul> </li> <li>e) Surveillance Testing <ul style="list-style-type: none"> <li>i) Independent verification should be used only when proven to satisfy independent verification requirements</li> </ul> </li> <li>f) Operation Self-Appraisal and Verification <ul style="list-style-type: none"> <li>i) Should be performed periodically to ensure that the ES&amp;H considerations, and operations functions are being conducted in accordance with established criteria</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>d) Throttled Valves <ul style="list-style-type: none"> <li>i) Position indicators are used in conjunction with observing the actions of valve actuators; for example, see <a href="#">OPM 7.1.11</a>, "25 kW Helium Refrigerator Cooldown"</li> </ul> </li> <li>e) Surveillance Testing <ul style="list-style-type: none"> <li>i) C-AD programs satisfy BNL institutional requirements in <a href="#">SBMS's "Integrated Assessment Program."</a></li> </ul> </li> <li>f) Operation Self-Appraisal and Verification <ul style="list-style-type: none"> <li>i) Operation self-appraisal and verification are performed periodically; see <a href="#">OPM 13.10.1</a>, "Independent Assessment."</li> </ul> </li> </ul>	